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By-Salmon, Richard; And Others

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Long-range planning involves the establishment of educational objectives within a rational philosophy, the design of activities and programs to meet stated objectives, the organization and allocation of resources to implement programs, and the analysis of results in terms of the objectives. Current trends of educational growth and complexity demand increasingly accurate, rapid, and extensive planning, but the drudgery of assembling, processing, and analyzing large quantities of data often reduces planning efficiency. With the Higher Education Long-Range Planning (HELP) program, college and university officers may construct a methematical model of an institution, simulate its behavior over a 10-year period under hypothesized conditions, and arrive at policy decisions that are likely to achieve desired objectives within the anticipated resources. The HELP approach involves philosophy (the "why" questions associated with an institution), objectives (the "what" type questions), programs (how activities will be conducted to achieve objectives), and resources (the allocation of personnel, facilities, funds, and time). Once a plan has been developed, it becomes the guide for implementation and analysis of results. The report discusses methods and model design, and presents 4 planning models actually in use to illustrate how varied institutions utilize the HELP program in their long-range planning processes. (WM)

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REPORT

A COMPUTER SIMULATION MODELING TOOL TO ASSIST COLLEGES IN LONG-RANGE PLANNING

FINAL REPORT
July 30, 1969

MRI Project No. 3279-D

For

Kansas City Regional Council for Higher Education
4901 Main Street
Kansas City, Missouri

HE 001 086

PARK COLLEGE

WILLIAM D. SUTTERFIELD
Director of Institutional Planning

KANSAS CITY, MISSOURI 64152
• Suburban Parkville •
Phone (816) 741-2000

PREFACE

The initial primary objective of this project was to develop a simulator model--useful and applicable to the KCRCHE Colleges.

We are very grateful that the officers of the Kansas City Regional Council permitted this objective to be modified. The result of the project was not one simulator model but rather a powerful technique by which the college administrator may design his own models in infinite variety.

Mr. Richard Salmon acted as the Project Leader in this work and was primarily responsible for the design of the system. Mr. Marc Semanoff assisted in the early part of the project. A large measure of the success of this project must be assigned to the ingenious capabilities of Mrs. Jeanne Robertson who did the programming. Mr. Duane Dieckman was responsible for the enormously difficult task of explaining and demonstrating on paper how the system is used to design and exercise planning models.

We especially want to acknowledge the indispensable liaison work and enthusiastic guidance of Mr. William Sutterfield, Director of Planning at Park College, who acted as Project Director for the Kansas City Regional Council for Higher Education.

Finally we wish to express our thanks to the officers of the Regional Council--Dr. Herb Wood, President, and Dr. Henry Halstead, Vice-President, as well as the Council's Administration Services Committee--Dr. William Schecter, Chairman, for their interest and support for this project.

Approved for:

MIDWEST RESEARCH INSTITUTE

John McKelvey

John McKelvey, Director
Economics and Management Science Division

July 30, 1969

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I. INTRODUCTION

A. Long-Range Planning

Over a period of the past decade or so, administrators and trustees of American higher education have been placing increasing emphasis on the need for long-range planning. Colleges and universities have traditionally been proponents and sources of change, though they have tended to be slow to change their own organizations, their major programs, and their ways of conducting their affairs.

The observation that our institutions of higher education find themselves the focus of many pressures, demands, and constraints is so common as to seem almost trite. Yet, if they are to succeed in their mission, it will be necessary for the administrative leadership to develop the understanding and techniques adequate for dealing with the complexity of the institutions for which they are responsible. Long-range planning has been widely acclaimed as an administrative approach to the problems of colleges and universities.

Long-range planning is the effort of an institution to give direction and establish control over its own future. It consists of the establishment of educational objectives within a rational philosophy, the design of activities and programs to meet the stated objectives, the organization and allocation of available resources to implement the programs, and the analysis of the results in terms of the objectives.

The considerations mentioned above are the most crucial aspects of the planning process. Yet the sheer drudgery of assembling, processing, and analyzing large quantities of data frequently reduces the effectiveness of the individuals engaged in planning.

B. The Simulation Tool

With the development of the electronic computer, a new technique, simulation, has evolved as a practical aid to planning. Simulation is dependent upon mathematics, and the construction of a mathematical model, to represent an organization's functions. The representation is based upon experience and observation, and consists of the assignment of quantitative values and relationships to the elements which make up the organization.

The simulation technique can be used to experiment with virtually all organizational factors, and provides, by analysis of various experiments with the model, a means for determining the "best" course of action to follow.

The Higher Education Long-Range Planning (HELP) program developed by Midwest Research Institute enables the Administrator-Planner to calculate, or simulate, quickly and accurately, the probable effects of various courses of action. With the use of the program, college and university officers may construct a mathematical model of their institution, simulate its behavior over a 10-year period under various hypothesized conditions, and arrive at policy decisions which are more likely to achieve the desired objectives within the anticipated resources.

II. THE PLANNING APPROACH

The general planning approach is outlined in terms of the steps shown in Figure 1. Each of the steps is important in the development of a long-range plan, and the evaluation of the plan's operation through time.

The first step, philosophy, deals with the "why" questions associated with an educational institution. The second step, objectives, deals with the "what" type questions. The third step, programs, deals with "how" activities will be conducted to achieve the objectives, and the fourth step, resources, involves the "with what", concerning allocation of personnel, facilities, funds, and time.

The HELP program is a tool which indicates the probable effects of program and resource decisions. For example, if the programs have been designed solely in light of the philosophy and objectives without considering the probable limitation of resources, it is likely that the first model "run" will indicate that it will not be feasible to proceed exactly as planned. A review of the available resources may make it necessary to replan some or all of the programs, or even to re-examine some of the objectives.

The procedure of establishing objectives, planning programs, and allocating resources may have to be repeated a number of times before the desired or acceptable objectives can be accomplished within the identifiable resource limitations.

Once a satisfactory and workable plan has been developed, it becomes the guide for implementation. The decisions relating to the faculty, facilities, equipment, funds, and time can be made with some assurance that their effect on the total program of the institution will be positive.

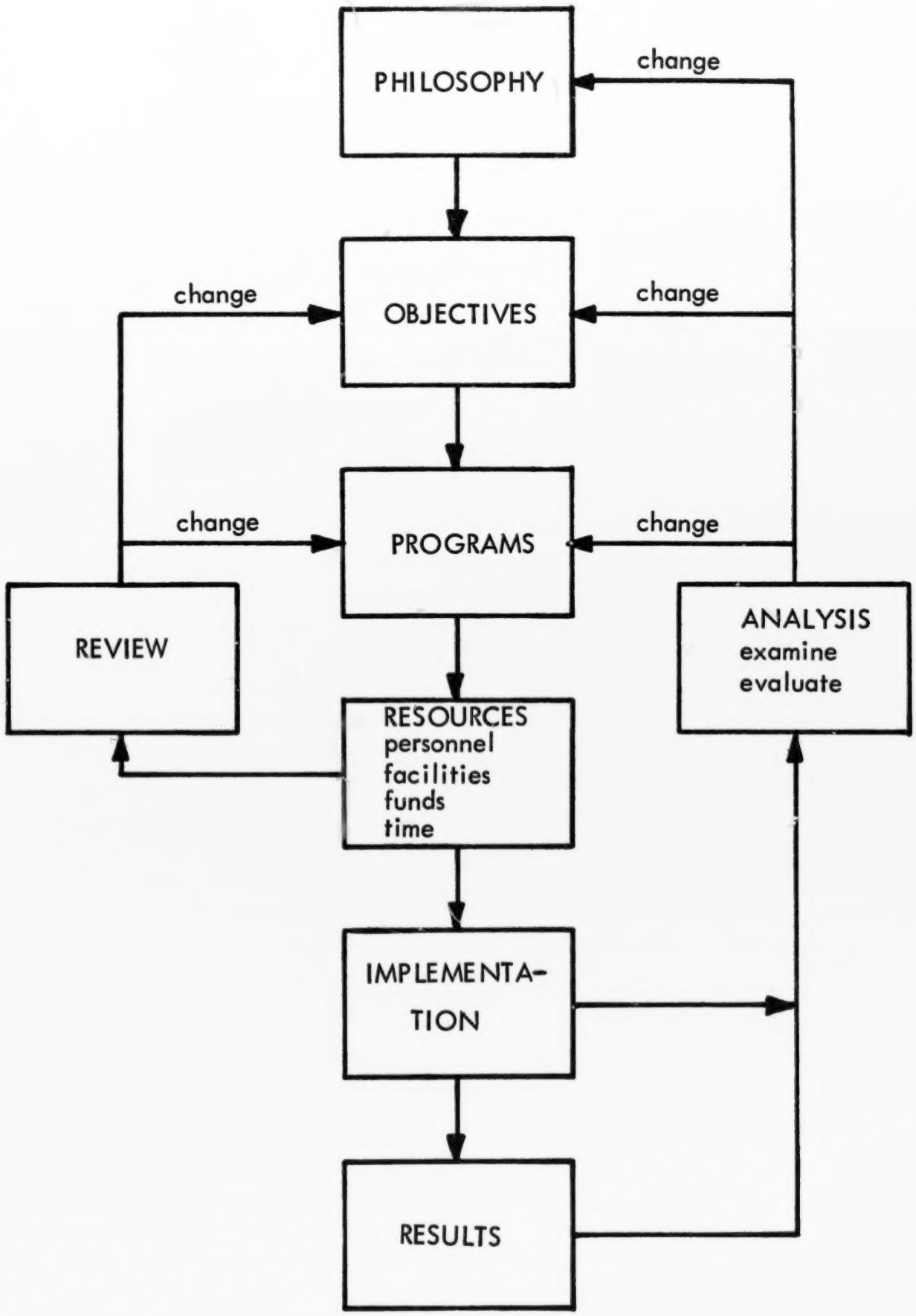


Figure 1 - The Planning Approach

The plan also becomes the guide for analysis of the processes of implementation and results. This analysis provides the basis for evaluation, and the possible re-examination of the philosophy, objectives, and programs. As new information is made available, trends are identified, changes in program goals are noted and the data can be readily input to the planning model and the effects determined. Thus, the planning process of continual examination and evaluation of the whole enterprise is enhanced by the planning model program capability.

III. DESIGN AND USE OF THE HELP PROGRAM MODEL

A. The Planning Tool

The HELP program when combined with specific information relating to an institution becomes a planning model. The following factors are important considerations which are implicit in the development of the model:

1. Data about the detailed characteristics of the organization are available.

2. The known and assumed facts concerning the organization have interrelationships which influence the institution's operation through time.

3. The ability to accurately assess the totality of all the relationships between parts is less reliable than knowledge of the parts individually.

4. The construction of a model, and observation of the interplay of the factors contained within it, provides greater understanding of the organization's operation.

5. The results need not be perfect to be beneficial.

As the model builder begins to construct the model, he should keep these considerations in mind. Also, as brought out above, he should direct his efforts to the objectives of the institution. The final value to be derived from the model can be no greater than the value of those objectives or goals. The choice of significant objectives depends on the builder's knowledge concerning his institution, and on his ability to relate that knowledge to causes and effects. Once the objectives have been specified, the next step is to design the structure and detail of the model. This is accomplished by selecting system boundaries identifying the items to be contained within the model, choosing interacting variables, and selecting values for parameters. The system boundaries must be related

to the objectives being sought. The items must be the elements of which the institution is comprised. The interacting variables must reflect the relationship of the interconnected institutional elements. The parameter values must be set at realistic levels which can be associated with the elements.

B. Details of HELP Program Techniques

Once the model builder has identified each item to be included in the planning model by both line number and name, he has a selection of seven methods for representing the characteristics of the item.

The most simple method is to insert the data for each of the 10 years of projection. This is useful for cases in which the item is not reported for some years, for irregular data, or cases in which specific data are available.

The second method is to insert the base data, then indicate that the value of that line is to be increased (or decreased) by a given percent each year. The line will be compounded, each yearly value being the given percentage above (or below) the previous year. This method is useful to forecast such items as salaries or other costs affected by inflation.

The third method is to insert the base data, then indicate a constant amount of increase (or decrease) for each year. The line will be computed, each yearly value being the constant value above (or below) the previous year. The base data are optional: zero is assumed if no data are inserted.

The fourth method lets the builder insert a goal value, and specify the year (relative to the planning horizon), in which the goal is to be reached. The base data are optional; the goal value can be either greater or less than the base figures. If the goal value is specified for earlier than the 10th year, the goal level will be held for the remainder of the 10 years.

The above four methods are called horizontal calculations, since they involve only the line on which data are inserted. The three remaining methods involve interline relationships.

The fiith method permits a line to be generated as the sum of other specified lines. This method provides a capability for subtotaling or totaling as needed.

The sixth method provides the builder with considerable potential in model design. The designer may use up to four other lines, plus constant values, in combinations of addition, subtraction, multiplication, and division. Accumulation across a line can also be provided.

The last method provides a means for the diagonalization of another line and the capability to multiply it by a given constant value. The diagonalization could be used for expressing one year's sophomores as a function for the previous year's freshmen.

Lines may be generated as functions of other factors; thus, functions may vary from year to year. Some lines may be used to analyze relationships, i.e., determining percentages or ratios, while others can be used to establish relationships. By the imaginative use of this capacity to interrelate lines, the builder has the capability of constructing an infinite variety of models. Most important of all, the college planning officer may do this model building and programming by himself--not relying on a technician who may really not understand the problem.

C. Examples of Model Design

In the formulation of the model design, the normal trend is to build upward from available knowledge about the separate items. However, it may be desirable, or even necessary, to construct an item by working backward from the known result elements. To demonstrate the planning model program flexibility in relation to the design approach, the following two examples demonstrate both of these approaches and show how elements of planning information may be derived.

The first example, Figures 2 and 3, consists of determining two result lines, one for line 12, Fees/Student, and the other for line 13, Endowment, Gift and Grant Income. These elements are the objectives being sought with this particular run.

Figure 2 shows the line number, the item (or element), the base (where applicable), and the method of determination which was used to generate the information. Figure 3 shows the model program output in terms of information for each line through the entire planning horizon. Note that in this model the given elements, or decision variables, of 1-Faculty, 2-Student-Faculty Ratio, 4-Average Faculty Compensation, 5-Departmental Expense, 7-Administration and General Expense, and 10-Percent G & E From Fees were used to derive, through interline relationships, all the remaining line values. The interline relationships remain the same, though the values differ, due to changes in the given elements, or decision variables across the planning horizon.

Line No.	Item	Base	Method of Determination
1	Faculty	30	Increase by 2 per year.
2	Student-Faculty Ratio	25.5	Decrease by 0.5 per year.
3	Students	--	Multiply line 1 by line 2.
4	Average Faculty Compensation	10,500	Increase by 4% per year.
5	Departmental Expense	14,500	Increase by 250 per year.
6	Instruction Expense	--	Multiply line 1 by line 4 and add line 5.
7	Administration & General Expense	315,000	Increase by 20,000 per year.
8	Total G & E Expense	--	Add line 6 to line 7 and divide by 94% (0.94).
9	Library	--	Multiply line 8 by 6% (0.06).
10	Percent G & E From Fees	48	Increase by 1.5 per year.
11	Total Fee Income	--	Multiply line 8 by 0.01 then by line 10.
12	Fees/Student	--	Divide line 11 by line 3.
13	Endowment, Gift, and Grant Income	--	Subtract line 11 from line 8.

Figure 2 - Model Design Example 1(a)

Line No.	Item	Base	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8	Yr9	Yr10
1	Faculty	30	32	34	36	38	40	42	44	46	48	50
2	Student-Faculty Ratio	25.5	25.0	24.5	24.0	23.5	23.0	22.5	22.0	21.5	21.0	20.5
3	Students	--	800	833	864	893	920	945	968	989	1,008	1,025
4	Average Faculty Compensation	10,500	10,920	11,357	11,811	12,283	12,774	13,285	13,816	14,369	14,944	15,542
5	Departmental Expense	14,500	14,750	15,000	15,250	15,500	15,750	16,000	16,250	16,500	16,750	17,000
6	Instruction Expense	--	364,190	401,138	440,446	482,254	526,710	573,970	624,154	677,474	734,062	794,100
7	Administration & General Exp.	315,000	335,000	355,000	375,000	395,000	415,000	435,000	455,000	475,000	495,000	515,000
8	Total G & E Expense	--	743,819	804,402	867,495	922,610	1,001,819	1,073,372	1,148,036	1,226,036	1,307,512	1,392,659
9	Library	--	44,629	48,264	52,050	55,357	60,109	64,402	68,882	73,562	78,451	83,560
10	% G & E From Fees	48.0	49.5	51.0	52.5	54.0	55.5	57.0	58.5	60.0	61.5	63.0
11	Total Fee Income	--	368,190	410,245	455,435	498,209	556,010	611,822	671,602	735,622	804,120	877,375
12	Fees/Student	--	460	492	527	558	604	647	694	744	798	856
13	Endowment, Gifts, & Grant Income	--	375,629	394,157	412,060	424,401	445,809	461,550	476,434	490,414	503,392	515,284

Figure 3 - Model Design Example 1(b)

The second example, Figures 4 and 5, determines four result lines: 3-Total Fee Income, 5-Faculty, 7-Total Faculty Compensation, and 9-Total Department Expense. Note that Fees/Student, an objective of Example 1, is a given decision variable in this example.

Figure 4 shows the line number, item, base, and method of determination. Figure 5 shows the model program output.

From the above examples it can be seen that unknown, or effect elements, can be derived from known, or cause elements, whether the unknown elements are general or specific. What is required is that the relationships between elements are known, and that they can be expressed in mathematical terms.

Design detail example, Figures 6 and 7, shows the detail to which the builder might want to develop one segment of the model. Figure 6 shows the line number, item, base, and method of determination. The base values used in lines 2 through 4 reflect the existing levels. Figure 7 shows the model program output.

The above example demonstrates how one segment of a model, Students, can be extended with very little effort to provide additional information. The identification of the level of detail desired is an important aspect of model design.

The end products of the model program, the reports, are designed for maximum flexibility--again, the planner programs his own reports and may even change report formation at each run. The information contained in any line of the planning matrix can be printed any number of times, and in any sequence. This flexibility permits the builder to create reports in the format that he feels is most appropriate to his institution and to suit his specific planning needs. To provide an example of the report design technique the information from Example 2, Figure 5 is used.

To generate the first report, input to the program the report name, "Students" and specify lines 1, 2 and 4. For the second report, input the name "Faculty" and specify lines 5, 6, 7 and 8.

The third report is called "Income" and includes lines 3 and 14. The last report, "Expenses", consists of lines 7, 9, 10, 13 and 12. The results of this report design are shown in the summary report Example, Figure 8.

Line No.	Item	Base	Method of Determination
1	Students	800	Increase by 3% per year.
2	Fees/Student	550	Increase by 7% per year.
3	Total Fee Income	--	Multiply line 1 by line 2.
4	Student-Faculty Ratio	23.0	Change to 18.0 in 5 years and hold.
5	Faculty	--	Divide line 1 by line 4.
6	Average Faculty Compensation	10,500	Increase by 4% per year.
7	Total Faculty Compensation	--	Multiply line 5 by line 6.
8	Department Expense/Faculty	500	Increase by 3% per year.
9	Total Department Expense	--	Multiply line 5 by line 8.
10	Administration & General Expense	315,000	Increase by 20,000 per year.
11	Library as Percent G & E	5.0	Insert 5.0 in years 1-3, 6.0 in years 4-7, 7.0 years 8-10.
12	Total G & E Expense	--	Add lines 7, 9, 10 and divide by 100 minus line 11.
13	Library	--	Line 12 minus the sum of lines 7, 9, and 10.
14	Non-Fee Income	--	Subtract line 3 from line 12.

Figure 4 - Model Design Example 2(a)

Line No.	Item	Base	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8	Yr9	Yr10
1	Students	800	824	849	874	900	927	955	984	1,014	1,044	1,132
2	Fees/Student	550	589	630	674	721	771	825	883	945	1,011	1,082
3	Total Fee Income	--	485,336	534,870	589,076	648,900	714,717	787,875	868,872	958,230	1,055,484	1,224,824
4	Student-Faculty Ratio	23.0	22.0	21.0	20.0	19.0	18.0	18.0	18.0	18.0	18.0	18.0
5	Faculty	--	37	40	44	47	52	53	55	56	58	63
6	Average Faculty Compensation	10,500	10,920	11,357	11,811	12,283	12,774	13,285	13,816	14,369	14,944	15,542
7	Total Faculty Compensation	--	404,040	454,280	519,684	577,301	664,248	704,105	759,880	804,664	866,752	979,146
8	Department Expense/Faculty	500	515	530	546	562	579	596	614	632	651	671
9	Total Department Expense	--	19,055	21,200	24,024	26,414	30,108	31,588	33,770	35,392	37,758	42,273
10	Administration & General Expense	315,000	335,000	355,000	375,000	395,000	415,000	435,000	455,000	475,000	495,000	515,000
11	Library as Percent G & E	5.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0	7.0	7.0	7.0
12	Total G & E Expense	--	797,995	874,189	967,061	1,062,463	1,180,166	1,245,418	1,328,351	1,414,030	1,504,849	1,652,063
13	Library	--	39,900	43,709	48,353	63,748	70,810	74,725	79,701	98,983	105,339	115,644
14	Non-Fee Income	--	312,659	339,319	377,985	413,563	465,449	457,543	459,479	455,809	449,365	427,239

Figure 5 - Model Design Example 2(b)

Line No.	Item	Base	Method of Determination
1	Freshman	297	Increase of 3% per year, sum on line 5.
2	Sophomore	187	Diagonalization of line 1 times 65%, sum on line 5.
3	Junior	146	Diagonalization of line 2 times 80%, sum on line 5.
4	Senior	127	Diagonalization of line 3 times 90%, sum on line 5.
5	Total Regular Students	--	Summary total of lines 1, 2, 3, and 4.
6	Special Students	--	Line 5 times 4%.
7	Total Students	--	Line 5 plus line 6.

Figure 6 - Design Detail Example (a)

Line No.	Item	Base	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8	Yr9	Yr10
1	Freshman	297	306	315	324	334	344	354	365	376	387	399
2	Sophomore	187	193	199	205	211	217	224	230	237	244	252
3	Junior	146	150	154	159	164	169	174	179	184	190	195
4	Senior	127	131	135	139	143	148	152	157	161	166	171
5	Total Regular Students	757	780	803	827	852	878	904	931	958	987	1,017
6	Special Students	30	31	32	33	34	35	36	37	38	39	41
7	Total Students	787	811	835	860	886	913	940	968	996	1,026	1,058

Figure 7 - Design Detail Example (b)

Summary Report : Students

	Planning Item	Base	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8	Yr9	Yr10
1	Students	800	824	849	874	900	927	955	984	1,014	1,044	1,132
2	Fees/Year	550	589	630	674	721	771	825	883	945	1,011	1,082
4	Student-Faculty Ratio	23.0	22.0	21.0	20.0	19.0	18.0	18.0	18.0	18.0	18.0	18.0

Summary Report : Faculty

	Planning Item	Base	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8	Yr9	Yr10
5	Faculty	--	37	40	44	47	52	53	55	56	58	63
6	Average Faculty Compensation	10,500	10,920	11,357	11,811	12,283	12,774	13,285	13,816	14,369	14,944	15,542
7	Total Faculty Compensation	--	404,040	454,280	519,684	577,301	664,248	704,105	759,880	804,664	866,752	979,146
8	Department Expense/Faculty	500	515	530	546	562	579	596	614	632	651	671

Summary Report : Income

	Planning Item	Base	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8	Yr9	Yr10
3	Total Fee Income	--	485,336	534,870	589,076	648,900	714,717	787,875	868,872	958,230	1,055,484	1,224,824
14	Non-Fee Income	--	312,659	339,319	377,985	413,563	465,449	457,543	459,473	455,809	449,365	427,239

Summary Report : Expenses

	Planning Item	Base	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8	Yr9	Yr10
7	Total Faculty Compensation	--	404,040	454,280	519,684	577,301	664,248	704,105	759,880	804,664	886,752	979,146
9	Total Department Expense	--	19,055	21,200	24,024	26,414	30,108	31,588	33,770	35,392	37,758	42,273
10	Adm. & General Expense	315,000	335,000	355,000	375,000	395,000	415,000	435,000	455,000	475,000	495,000	515,000
13	Library	--	39,900	43,709	48,753	63,748	70,810	74,725	79,701	98,983	105,339	115,664
12	Total G & E Expense	--	797,995	874,189	967,061	1,062,463	1,180,166	1,245,418	1,328,351	1,414,039	1,504,849	1,652,063

Figure 8 - Summary Report Example

The ease of report design and the almost unlimited flexibility provided by the program permit the model builder to generate reports which may range from a broad general summary of the entire planning matrix to the details of a specific element on which attention is to be focused. This adaptability permits the reports to be created in a format unique to a given institution, and allows the report emphasis to be altered at will, offering maximum value in planning for the future.

D. The Plan Refining Cycle

The model builder can use the HELP program to experiment with virtually every aspect of the organization, and can see the consequences of various alternative actions. Figure 9 depicts, in the "Plan Refining Cycle", the iterative process that would be logically associated with the development of a long-range plan. By examination of the program output, the elements indicating need for changes are identified, and modifications can be made to parameter values or interline relationships. Thus, by the process of changing the base plan, making a computer run, and reviewing the output, the effects of a certain decision can be noted quickly and economically.

An additional benefit of the refining cycle is that a variety of plans can be tested and the results analyzed without any "trial and error" effects being imposed upon the institution.

IV. SUMMARY

From the above examples, it is evident that the model builder has an almost infinite number of alternatives in designing a model to represent his institution. However, the high degree of freedom in both model and report design requires that the objectives of the institution be used as a basis for the planning process and that knowledge of the organization be applied to a level of detail adequate to define the operation of the institution.

Planning is a dynamic process which must be responsive to frequent change. The current trends of growth and complexity in education demand that today's planning must be more accurate, rapid, and extensive than ever before. The use of the HELP program provides the ability to meet that need.

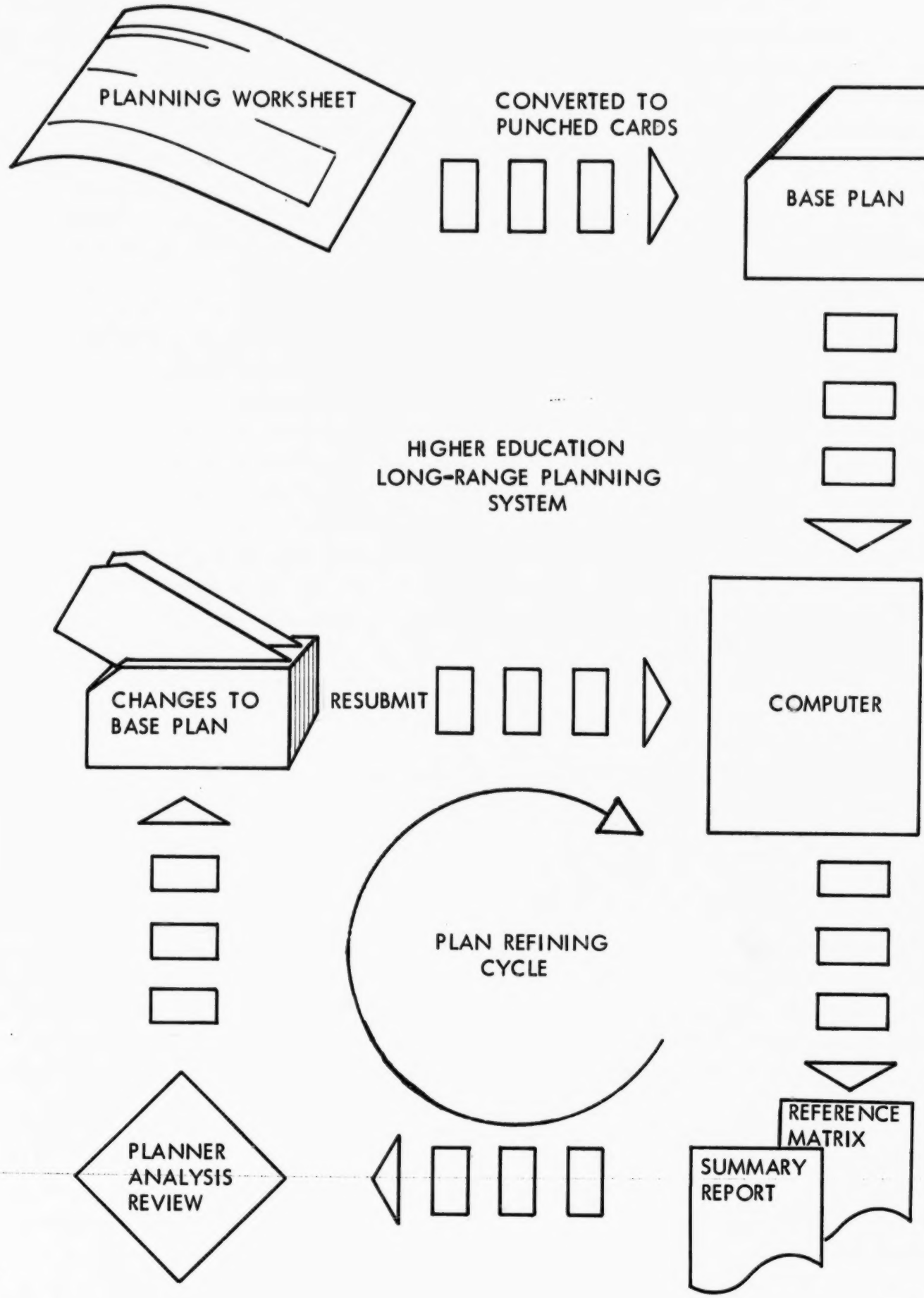


Figure 9 - Plan Refining Cycle

APPENDIX A

EXAMPLES OF FOUR COLLEGE PLANS

The following four plans are given as examples of how various educational institutions utilize the HELP program in their long-range planning processes. Each of the planning models is actually in use by a KCRCHE college. Therefore, the resulting data--which are private information--cannot be given. However, the elements of the model and the method of determination for an element line of data are provided. By the examination and study of these examples, the model builder can better understand the techniques involved in model design.

COLLEGE PLAN 1

Line No.	Item	Method of Determination
1	Faculty	Provide 10 given yearly values.
2	Student-Faculty Ratio	Divide line 3 by line 1.
3	Students	Provide 10 given yearly values.
4	Block 1	Provide given yearly value for year 1.
5	Block 2	Provide given yearly values for years 2-10.
6	Faculty Compensation 1	Provide given yearly value for year 1.
7	Faculty Compensation 2	Change by given percentages per year.
8	Average Faculty Compensation	Provide 10 given yearly values.
9	Total Faculty Compensation	Multiply line 1 times line 8.
10	Department Expense 1	Provide given yearly value for year 1.
11	Department Expense 2	Given percentage of line 9.
12	Departmental Expense	Summary of lines 45 and 46.
13	Total Instruction	Add lines 9 and 12.
14	Total Instruction as % G & E	Provide 10 given yearly values.
15	Computation Total G & E 1	Provide given yearly value for year 1.
16	Computation Total G & E 2	Divide line 13 by given % of line 14.
17	Total G & E Budget	Summary of lines 47 and 48, sum on line 41.
18	Admin. & Gen. Exp. as % G & E	Provide 10 given yearly values.
19	Admin. & Gen. Expense	Given percentage of line 18 times line 17.
20	Library Exp. as % G & E	Provide 10 given yearly values.
21	Library Expense	Given percentage of line 20 times line 17.
22	Educational R & D as % G & E	Provide 10 given yearly values.
23	Educational R & D	Given percentage of line 22 times line 17.
24	Plant Operation as % G & E	Provide 10 given yearly values.
25	Plant Operation Expense	Given percentage of line 24 times line 17.
26	Student Tuition & Fees/Yr.	Provide 10 given yearly values.
27	Total Fee Income	Multiply line 3 times line 26.
28	% Tuition & Fees to Stu. Aid	Provide 10 given yearly values.

COLLEGE PLAN 1 (Concluded)

Line No.	Item	Method of Determination
29	Tuition & Fees to Stu. Aid	Given percentage of line 28 times line 27.
30	Tuition to G & E	Subtract line 29 from line 27, sum on line 34.
31	Endowment Income	Provide 10 given yearly values, sum on line 34.
32	Other Income	Provide 10 given yearly values, sum on line 34.
33	Gifts & Grants	Provide 10 given yearly values, sum on line 34.
34	Total G & E Income	Summary of lines 30, 31, 32, and 33, sum on line 42.
35	Funded Student Aid	Provide 10 given yearly values, sum on line 41.
36	Total Student Aid	Values reflected in line 29, sum on line 42.
37	Auxiliary Enterprise Expense	Change of given constant value per year, sum on line 41.
38	Auxiliary Enterprise Income	Change by given constant value per year, sum on line 42.
39	Plant Fund Expense	Change by given constant value per year, sum on line 41.
40	Plant Fund Income	Change by given constant value per year, sum on line 42.
41	Total Current Expense	Summary of lines 17, 35, 37, and 39.
42	Total Current Income	Summary of lines 34, 36, 38, and 40.
45	Block 3	Multiply line 10 times line 4, sum on line 12.
46	Block 4	Multiply line 11 times line 5, sum on line 12
47	Block 5	Multiply line 15 times line 4, sum on line 17.
48	Block 6	Multiply line 16 times line 5, sum on line 17.
49	Operating Surplus	Subtract line 39 and 17 from line 34.
50	Cumulative Surplus	Accumulate values of line 49.

COLLEGE PLAN 2

Line No.	Item	Method of Determination
1	Freshman	Given percentage of line 6.
2	Sophomores	Given percentage of line 6.
3	Juniors	Given percentage of line 6.
4	Seniors	Given percentage of line 6.
5	Specials	Given percentage of line 6.
6	Total Head Count	Change to given goal level in given number of years.
7	Fall FTE	Given percentage of line 6.
8	Resident as % Head Count	Change by given percentage per year.
9	Resident Students	Given percentage of line 8 times line 6.
12	Tuition Per Year	Change by given constant value per year.
13	Fees Per Year	Change by given constant value per year.
14	Room Per Year	Change by given constant value per year.
15	Board Per Year	Change by given percentage per year.
16	Full Time Faculty	Change to given goal level in given number of years.
17	Student Faculty Ratio	Divide line 7 by line 16.
18	Instructors - % FTE Faculty	Change to given goal level in given number of years.
19	Instructors FTE	Given percentage of line 18 times line 16, sum on line 26.
20	Assistants - % FTE Faculty	Change to given goal level in given number of years.
21	Assistant Professors FTE	Given percentage of line 20 times line 16, sum on line 26.
22	Associates - % FTE Faculty	Change to given goal level in given number of years.
23	Associate Professors FTE	Given percentage of line 22 times line 16, sum on line 26.
24	Professors - % FTE	Change to given goal level in given number of years.
25	Full Professors FTE	Given percentage of line 24 times line 16, sum on line 26.
26	All Ranked Faculty	Summary of lines 19, 21, 23 and 25.
27	Lectures FTE	Subtract line 26 from line 16.
28	Avg. Instructor Salary	Change by given percentage per year.
29	Avg. Assistant Salary	Change by given percentage per year.
30	Avg. Associate Salary	Change by given percentage per year.
31	Avg. Professor Salary	Change by given percentage per year.
32	Lecturers Salary/Cr. Hr.	Provide 10 given yearly values.

COLLEGE PLAN 2 (Continued)

Line No.	Item	Method of Determination
33	Fringes As % of Salary	Change to given goal level in given number of years.
34	Average Total Compensation	Divide line 68 by line 16.
35	Library	Heading.
36	Professional Staff	Provide 10 given yearly values.
37	Volumes Held	Change to given goal level in given number of years.
38	Periodicals	Change to given goal level in given number of years.
39	Stations As % FTE Students	Provide 10 given yearly values.
40	Student Stations Goal	Given percentage of line 39 times line 7.
41	Income	Heading.
42	Student Tuition and Fees	Add lines 12 and 13, times given percentage of line 7, sum on line 48.
43	Contributed Services	Change by given percentage per year, sum on line 48.
44	Federal Grants	Change to given goal level in given number of years, sum on line 48.
45	Gifts	Change to given goal level in given number of years, sum on line 48.
46	Endowments	Change by given percentage per year, sum on line 48.
47	Short-Term Investments	Change by given percentage per year, sum on line 48.
48	Total Education & Gen. Income	Summary of lines 42, 43, 44, 45, 46, and 47.
49	Resident Hall Income	Multiply line 9 times line 14, sum on line 54.
50	Food Service Income	Multiply line 9 times line 15, sum on line 54.
51	Books & Supplies/Student	Change by given percentage per year.
52	Bookstore Income	Multiply line 6 times line 51, sum on line 54.
53	Other Auxiliary	Given percentage of line 52, sum on line 54.
54	Total Auxiliary Income	Summary of lines 49, 50, 52, and 53, sum on line 58.
55	Student Aid-Govt.	Change to given goal level in given number of years, sum on line 57.
56	Endowment and Gifts	Change to given goal level in given number of years, sum on line 57.
57	Total Student Aid	Summary of lines 55 and 56, sum on line 58.
58	Total Current Income	Summary of lines 54 and 57.
59	Educational & General Exp.	Heading.
60	Total Salary - Instructor	Multiply line 19 times line 28, sum on line 64.
61	Total Salary - Assistant	Multiply line 21 times line 29, sum on line 64.

COLLEGE PLAN 2 (Concluded)

Line No.	Item	Method of Determination
62	Total Salary - Associate	Multiply line 23 times line 30, sum on line 64.
63	Total Salary - Professor	Multiply line 25 times line 31, sum on line 64.
64	Total Salary for Ranks	Summary of lines 60, 61, 62, and 63.
65	Fringe Benefits - Dollars	Given percentage of line 33, times line 34.
66	Total Compensation - Ranks	Add lines 64 and 65, sum on line 68.
67	Total Lecturer's Fees	Given percentage of line 27, times line 32, sum on line 68.
68	Total Instructional Comp.	Summary of lines 66 and 67, sum on line 71.
69	Instr. Support as % Comp.	Change to given goal level in given number of years.
70	Instructional Support	Given percentage of line 69, times line 68, sum on line 71.
71	Total Instruction	Summary of lines 68 and 70, sum on line 78.
72	Total Educational & General	Divide line 71 by given constant value, sum on line 85.
73	Administration	Given percentage of line 72, sum on line 78.
74	Student Services	Given percentage of line 72, sum on line 78.
75	Development	Given percentage of line 72, sum on line 78.
76	Gen. Institutional Expense	Given percentage of line 72, sum on line 78.
77	Library	Given percentage of line 72, sum on line 78.
78	Education & Gen. Except Plant	Summary of lines 71, 73, 74, 75, 76, and 77.
79	Operation & Maint. of Plant	Subtract line 78 from line 72.
80	Auxiliary Expense	Given percentage of line 54, sum on line 85.
81	Student Aid	Divide line 42 by given constant value, sum on line 83.
82	E-O-G	Values reflected in line 55, sum on line 83.
83	Total Aid	Summary of lines 81 and 82, sum on line 85.
84	Other Current Expense	Change by given constant value per year, sum on line 85.
85	Total Current Expense	Summary of lines 72, 80, 83, and 84.
86	Current Surplus (Loss)	Subtract line 85 from line 58.
87	Cumulated Surplus (Loss)	Accumulate line 86.
88	Debt Retirement	Provide 10 given yearly values.
89	Misc. Student Income	Change by given constant value per year.

COLLEGE PLAN 3

Line No.	Item	Method of Determination
1	Students-Fall Head Count	Provide 10 given yearly values.
2	Special Students	Given percentage of line 1.
3	Total Fall Head Count	Add lines 1 and 2.
4	Fall FTE	Given percentage of line 3.
5	Residents Percent	Change by given percentage per year.
6	Resident Number	Given percentage of line 5, times line 3.
7	Commuting Students Percent	Change by given percentage per year.
8	Number - Commuting Students	Given percentage of line 7, times line 3.
9	Special Student Percent	Given percentage of line 2, divided by line 3.
10	Student Faculty Ratio	Change by given percentage per year.
11	Faculty FTE	Divide line 4 by line 10.
12	Average Faculty Salary	Change to given goal level in given number of years.
13	Fringes As % Salary	Change to given goal level in given number of years.
14	Average Total Compensation	Given percentage of line 13, times line 12, added to line 12.
15	Total Faculty Compensation	Multiply line 11 times line 14, sum on line 89.
16	Faculty Comp. As % G & E	Given percentage of line 15, divided by line 46.
17	Learning Resources	Change by given constant value per year.
18	L R Professional Staff	Provide 10 given yearly values.
19	Avg. Comp L R Staff	Change to given goal level in given number of years.
20	Total Comp L R Staff	Multiply line 18 times line 19, sum on line 22.
21	L R Support Staff	Change to given goal level in given number of years, sum on line 22.
22	Total L R Expenses	Summary of lines 20 and 21.
23	Number of Departments	Change by given percentage per year.
24	Avg. Supplies & Dept. Exp.	Change by given percentage per year.
25	Total Supplies & Expense	Multiply line 23 times line 24.
26	Educational R & D	Given percentage of line 85, times line 28.
27	Instr. Related PGM Exp.	Given percentage of line 86, times line 28.
28	Total Instr. Support Costs	Add lines 22 and 25, divide by given percentage of line 87, sum on line 89.
29	Instr. Support As % G & E	Given percentage of line 28, divided by line 46.
30	Total Admin. Expense	Given percentage of line 31, times line 46, sum on line 89.

COLLEGE PLAN 3 (Continued)

Line No.	Item	Method of Determination
31	Total Admin. Exp. As % G & E	Change to given goal level in given number of years.
32	Student Services	Given percentage of line 33 times line 46, sum on line 89.
33	Student Ser. As % G & E	Change to given goal level in given number of years.
34	Development & Public Rel.	Given percentage of line 35 times line 46, sum on line 89.
35	Dev. & PR As % G & E	Change to given goal level in given number of years.
36	Plant Operation & Maint.	Subtract line 89 from line 46.
37	Plant Opr. & Maint. As % G & E	Given percentage of line 36, divided by line 46.
38	Contingency Fund	Given percentage of line 39, times line 46, sum on line 89.
39	Contingency As % G & E	Change to given goal level in given number of years.
40	Unfunded Student Aid	Given percentage of line 41, times line 46, sum on line 89.
41	Unfunded Aid As % G & E	Change to given goal level in given number of years.
42	General Institutional Expense	Given percentage of line 43, times line 46, sum on line 89.
43	Gen. Instit Exp. As % G & E	Change to given goal level in given number of years.
44	General Equipment Expense	Given percentage of line 45, times line 46, sum on line 89.
45	Gen. Equip As % G & E	Change by given percentage per year.
46	Total G & E Expense	Add lines 28 and 15, divide by given percentage of line 88, sum on line 59.
47	Food Service Cost/Stu/Day	Change by given percentage per year.
48	Number of Food Service Days	Change by given percentage per year.
49	Total Food Service Cost/Yr	Multiply line 6 times line 47, times line 48, sum on line 57.
50	Aux. Ent. Personnel Except Food	Change by given percentage per year.
51	Avg. Comp. Aux. Ent. Personnel	Change by given percentage per year.
52	Total Comp. Aux. Ent. Personnel	Multiply line 50 times line 51, sum on line 57.
53	Dorm Oper. & Maint./Res Student	Change by given percentage per year.
54	Dorm Operation & Maint.	Multiply line 6 times line 53, sum on line 57.
55	Debt Retirement Service	Provide 10 given yearly values.
56	Other Aux. Ent. Expense	Change by given percentage per year, sum on line 57.
57	Total Aux. Ent. Expense	Summary of lines 49, 52, 54, 55, and 56, sum on line 59.
58	Admin. Bldg. Renovation	Provide 10 given yearly values, sum on line 59.
59	Total Current Expense	Summary of lines 46, 57, and 58.
60	Cum. Admin. Bldg. Renovation	Accumulate values in line 58.

COLLEGE PLAN 3 (Concluded)

Line No.	Item	Method of Determination
61	Tuition & Fees 1	Provide given yearly value for year 1.
62	Tuition & Fees 2-10	Divide line 65 by line 1, divided by given percentage.
63	Tuition & Fees/Year	Multiply line 90 times line 62, add to line 61.
64	Tuition & Fees As % Instr.	Change to given goal level in given number of years.
65	Total Tuition & Fees Income	Add lines 15 and 28, multiply times line 64, sum on line 76.
66	Tuition & Fees As % G & E	Given percentage of line 65 divided by line 76.
67	Rel. Comm. Contribution	Change by given percentage per year, sum on line 70.
68	Government Grants	Provide 10 given yearly values, sum on line 70.
69	Other Gifts & Grants	Change to given goal level in given number of years, sum on line 70.
70	Total Gifts & Grants	Summary of lines 67, 68, and 69, sum on line 76.
71	Gifts & Grants As % G & E	Given percentage of line 70, divided by line 76.
72	Endowment Income	Change by given percentage per year, sum on line 76.
73	Endowment As % G & E	Given percentage of line 72, divided by line 76.
74	Miscellaneous Income	Change by given percentage per year, sum on line 76.
75	Misc.Income As % G & E	Given percentage of line 74, divided by line 76.
76	Total G & E Income	Summary of line 65, 70, 72, and 74.
77	Room & Board/Year	Change by given percentage per year.
78	Total Room & Board Income	Given percentage of line 6, times line 77.
79	Other Auxiliary Income	Change by given percentage per year.
80	Total Auxiliary Income	Add lines 78 and 79.
81	Total Current Income	Add lines 76 and 80.
82	G & E Surplus	Subtract line 46 from line 76.
83	Auxiliary Surplus	Subtract line 57 from line 80.
84	Total Current Surplus	Subtract line 59 from line 81.
85	Educ. R & D As % Total Instr.	Change to given goal level in given number of years.
86	Instr. Rel. As % Total Instr.	Change by given percentage per year.
87	L R & Dept. Exp. As % Instr.	Given constant value minus line 85, minus line 86.
88	Instruction As % G & E	Change to given goal level in given number of years.
89	G & E Except Plant	Summary of lines 15, 28, 30, 32, 34, 38, 40, 42, and 44.
90	Block Years 2-10	Provide given yearly values for years 2-10.

COLLEGE PLAN 4

Line No.	Item	Method of Determination
1	Students	Heading.
2	Fall Head Count	Heading.
3	Freshman - Day	Given percentage of line 8, sum on line 111.
4	Sophomore - Day	Given percentage of line 8, sum on line 111.
5	Junior - Day	Given percentage of line 8, sum on line 111.
6	Senior - Day	Given percentage of line 8, sum on line 111.
7	Special - Day	Subtract line 111 from line 8.
8	Subtotal - Day	Change to given goal level in given number of years.
9	Evening	Change by given percentage per year.
10	Total Fall Head Count	Add lines 8 and 9.
11	Full Time Equivalent	Heading.
12	Fall - Day	Given percentage of line 8, sum on line 17.
13	Fall - Evening	Given percentage of line 9, sum on line 17.
14	Spring - Day	Given percentage of line 12, sum on line 17.
15	Spring - Evening	Given percentage of line 13, sum on line 17.
16	Summer	Change by given percentage per year, sum on line 17.
17	Total Annual FTE	Summary of lines 12, 13, 14, 15, and 16.
18	Tuition & Fees/Sem-Day	Provide 10 given yearly values.
19	Tuition/Hour-Evening	Provide 10 given yearly values.
20	Room & Board/Semester	Provide 10 given yearly values.
21	Resident Pct - Day	Change by given constant value per year.
22	Resident No - Fall Day	Given percentage of line 21, times line 8.
23	Faculty - Day	Heading.
24	Instructor	Given percentage of line 29, sum on line 112.
25	Assistant Professor	Given percentage of line 29, sum on line 112.
26	Associate Professor	Given percentage of line 29, sum on line 112.
27	Professor	Given percentage of line 29, sum on line 112.
28	Other	Subtract line 112 from line 29.
29	Total Day Faculty	Divide line 12 by line 30.

COLLEGE PLAN 4 (Continued)

Line No.	Item	Method of Determination
30	Student Faculty Ratio	Change to given goal level in given number of years.
31	Avg. Salary - Instructor	Change by given percentage per year.
32	Avg. Salary - Ass't. Prof.	Change by given percentage per year.
33	Avg. Salary - Assoc. Prof.	Change by given percentage per year.
34	Avg. Salary - Professor	Change by given percentage per year.
35	Avg. Salary - Other	Change by given constant value per year.
36	Grand Average Salary	Divide line 71 by line 29.
37	Fringes as % Salary	Change by given constant value per year.
38	Overall Compensation Avg.	Given percentage of line 37 times line 36, plus line 36.
39	Income - Educ. & Gen.	Heading.
40	Tuition & Fees - Day	Add lines 12 and 14, times given percentage of line 18, sum on line 43.
41	Tuition & Fees - Evening	Add lines 13 and 15, times given percentage of line 19, sum on line 43.
42	Tuition & Fees - Summer	Line 18 minus given constant, divided by given constant, times line 16, sum on line 43.
43	Tuition & Fees - Full Year	Summary of lines 40, 41, and 42, sum on line 118.
44	Tuition & Fees as % G & E	Given percentage of line 43, divided by line 53.
45	Contributed Services	Change by given percentage per year, sum on line 118.
46	Contr. Servs. as % G & E	Given percentage of line 45, divided by line 53.
47	Gifts & Grants	Subtract line 118 from line 53.
48	Gifts & Grants as % G & E	Given percentage of line 47, divided by line 53.
49	Endowments	Change by given percentage per year, sum on line 118.
50	Endowments as % G & E	Given percentage of line 49, divided by line 53.
51	Other G & E Income	Change by given percentage per year, sum on line 118.
52	Other Income as % G & E	Given percentage of line 51, divided by line 53.
53	Total Educ. & Genl. Income	Subtract lines 59, 66, and 67 from line 68.
54	Student Aid Income	Heading.
55	Gifts	Given percentage of line 56, times line 40, sum on line 59.
56	Gifts as % Day Tuition	Change to given goal level in given number of years.
57	Endowment	Change by given percentage per year, sum on line 59.
58	Government	Provide given yearly values for years 1-7, sum on line 59.

Line No.	Item	Method of Determination
59	Total Student Aid Income	Summary of lines 55, 57, and 58.
60	Student Aid As % G & E	Divide line 59 by line 53.
61	Auxiliary Enterprises Income	Heading.
62	Room & Board	Given percentage of line 22, times line 20, sum on line 66.
63	Bookstore	Given percentage of line 17, times given constant, sum on line 66.
64	Athletics	Change by given percentage per year, sum on line 66.
65	Other Auxiliary	Change by given percentage per year, sum on line 66.
66	Total Auxiliary Income	Summary of lines 62, 63, 64, and 65.
67	Other Income	Provide given yearly value for 1st year.
68	Total Current Income	Values as reflected in line 99.
69	Expenses - Educ. & Genl.	Heading.
70	Instruction	Heading.
71	Instr. Salaries - Regular Yr.	Summary of lines 113, 114, 115, and 116, sum on line 75.
72	Instr. Support	Given percentage of line 71, sum on line 75.
73	Evening Division	Change by given percentage per year, sum on line 75.
74	Summer Session	Given percentage of line 71, sum on line 75.
75	Total Instructional Expense	Summary of lines 71, 72, 73, and 74.
76	Instr. As % G & E	Given percentage of line 75, divided by line 87.
77	Library	Given percentage of line 78, times line 87.
78	Library As % G & E	Change to given goal level in given number of years.
79	Genl. Administration	Heading.
80	Genl. Administration	Given percentage of line 87, sum on line 83.
81	Faculty & Staff Benefits	Given percentage of line 87, sum on line 83.
82	Development	Given percentage of line 87, sum on line 83.
83	Total Genl. Administration	Summary of lines 80, 81, and 82.
84	Genl. Admin. As % G & E	Given percentage of line 83, divided by line 87.
85	Operation & Maint. - Academic	Given percentage of line 86, times line 87.
86	Oper & Maint. As % G & E	Change to given goal level in given number of years.
87	Total G & E Expense	Divide line 75 by given constant value.
88	Student Aid Expense	Heading.
89	Funded	Values as reflected in line 59, sum on line 91.

COLLEGE PLAN 4 (Concluded)

Line No.	Item	Method of Determination
90	Unfunded	Given percentage of line 40, minus line 59, sum on line 91.
91	Total Student Aid Expense	Summary of lines 89 and 90.
92	Auxiliary Enterprises	Heading.
93	Residence Halls	Provide 10 given yearly values, sum on line 97.
94	Food Services	Given percentage of line 22, times given constant, sum on line 97.
95	Bookstore	Given percentage of line 63, sum on line 97.
96	Athletics	Change by given percentage per year, sum on line 97.
97	Total Auxiliary Expense	Summary of lines 93, 94, 95, and 96, sum on line 99.
98	Debt Service	Provide 10 given yearly values, sum on line 99.
99	Total Current Expense	Summary of lines 97 and 98.
100	Cumulated Gifts & Grants	Accumulate values of line 47.
111	Day Enrolled Less Special	Summary of lines 3, 4, 5 and 6.
112	Regular Day Faculty	Summary of lines 24, 25, 26, and 27.
113	Total Salary - Instr.	Multiply line 24 times line 31, sum on line 71.
114	Total Salary - Ass't	Multiply line 25 times line 32, sum on line 71.
115	Total Salary - Assoc.	Multiply line 26 times line 33, sum on line 71.
116	Total Salary - Prof.	Multiply line 27 times line 34, sum on line 71.
117	Total Salary - Other	Multiply line 28 times line 35.
118	G & E Income Except Gifts	Summary of lines 43, 45, 49, and 51.

APPENDIX B

HOW TO USE THE PLANNING WORKSHEETS

The input to the HELP program uses three data sheets to provide information and instructions.

I. Run Identification Data Sheet

The first data sheet, called the Run Identification Data Sheet (Figure B-1), is used to input identifying information to the program.

The contents of the data fields are as follows:

1. Institution Name - columns 1-24. Contains the name of the institution.

2. Date - columns 25-40. Contains the date of the run.

3. Description - columns 41-56. Contains supplementary information.

4. Base Year - columns 57-60. Contains the base year number.

5. Plan - columns 61-63. Contains an identifying number of the program run.

II. Instruction Data Sheet

The second data sheet, called the Instruction Data Sheet (Figure B-2), is used to reflect the technique to be used on each line of the model. Each line, regardless of the method of calculation, is comprised of two cards.

A. Code 1 - Summary of Lines

The first method permits the line to be used as a summary or total of other lines.

RUN IDENTIFICATION DATA SHEET

INSTITUTION (1–24)	DATE (25–40)	DESCRIPTION (41–56)	BASE YEAR (57–60)	PLAN (61–63)	

Figure B-1

INSTRUCTION DATA SHEET

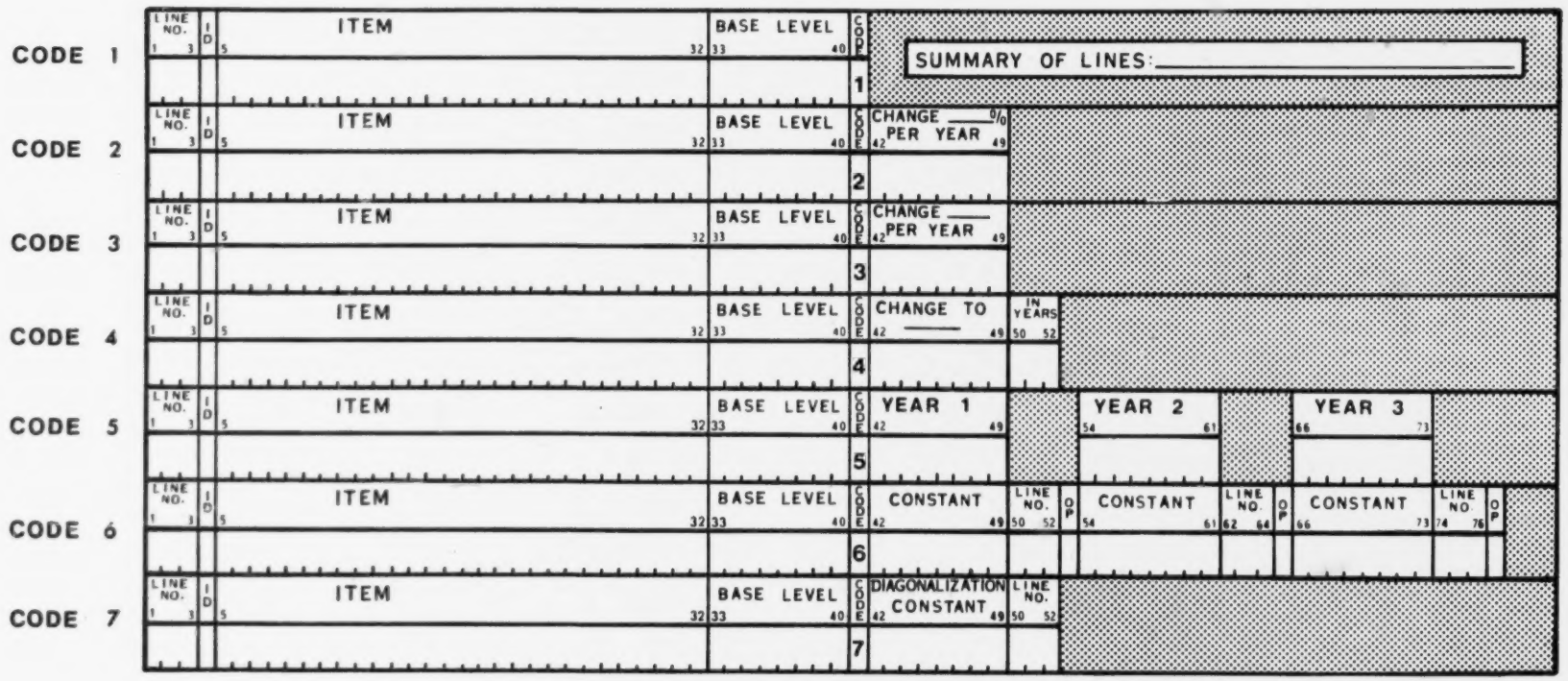
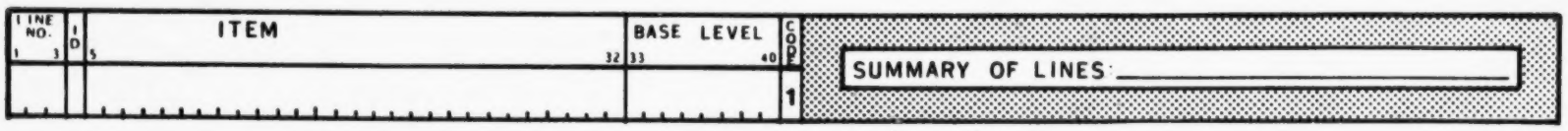
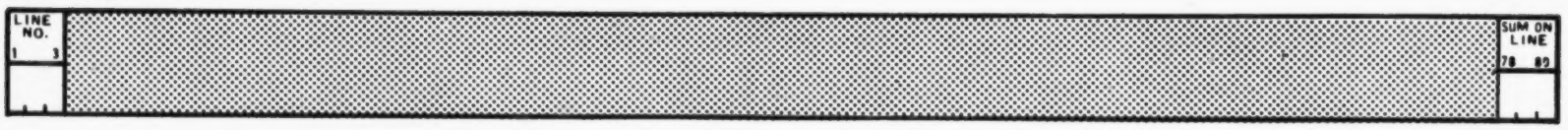


Figure B-2

Card 1



Card 2



The contents of the data fields are as follows:

Card 1:

1. Line Number - columns 1-3. Contains the line number.

2. Change ID - column 4. Contains a number to identify changes associated with a line.

3. Item - columns 5-32. Contains a description of the contents of the line.

4. Base Level - columns 33-40. Contains the value for the base year.

5. Code - column 41. Contains the method code "1".

Card 2:

6. Line Number - columns 1-3. Same as Card 1 (1) above.

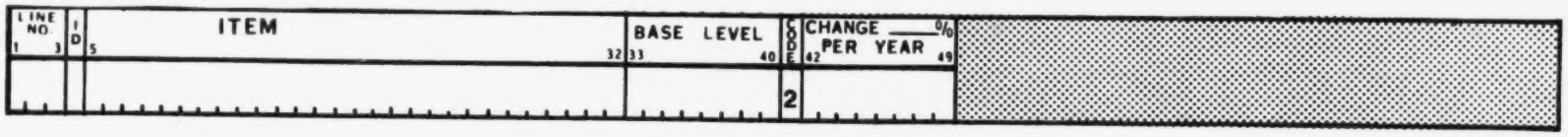
7. Sum on Line - columns 78-80. Contains the line number of the line to which values generated on this line are summed.

The Code 1 data line also provides space "Summary of Lines," where the model builder may insert those line numbers that were added together to form the line. This information is for control, and is not keypunched into the card.

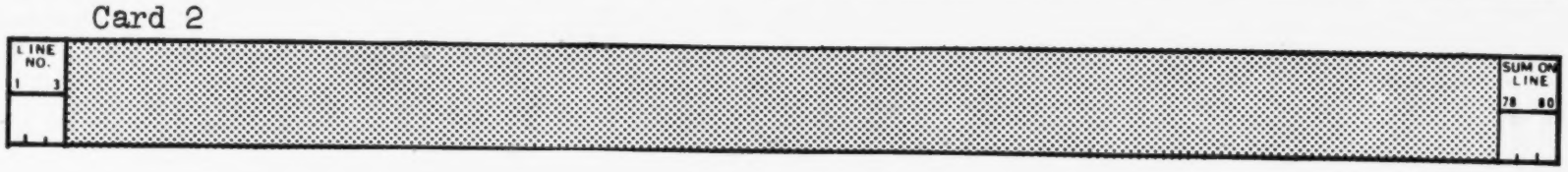
B. Code 2 - Change by Percentage per Year

The second method permits the change of the base level by a given percentage for each year.

Card 1



Card 2



The contents of the data fields are as follows:

Card 1:

1. Line Number - columns 1-3. Contains the line number.

2. Change ID - column 4. Contains a number to identify the changes associated with a line.

3. Item - columns 5-32. Contains a description of the contents of the line.

4. Base Level - columns 33-40. Contains the value for the base year.

5. Code - column 41. Contains the method code "2".

6. Change Percentage - columns 42-49. Contains the value of the change percentage.

Card 2:

7. Line Number - columns 1-3. Same as card 1 (1) above.

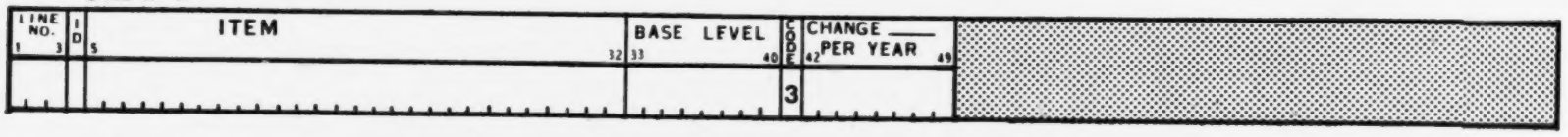
8. Sum on Line - columns 78-80. Contains the line number of the line to which values generated on this line are summed.

If the change percentage is left blank, the value for the base level will be inserted along the entire planning horizon.

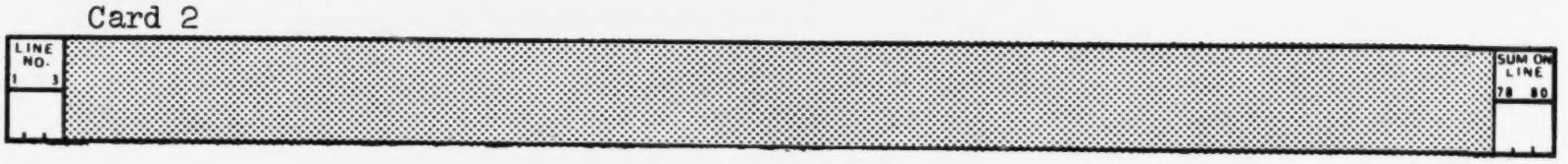
C. Code 3 - Change by Constant per Year

The third method permits the change of the base level by a given constant value for each year.

Card 1



Card 2



The contents for the data fields are as follows:

Card 1:

1. Line Number - columns 1-3. Contains the line number.

2. Change ID - column 4. Contains a number to identify the changes associated with a line.

3. Item - columns 5-32. Contains a description of the contents of the line.

4. Base Level - columns 33-40. Contains the value for the base year.

5. Code - column 41. Contains the method code "3".

6. Change Constant - columns 42-49. Contains the value of the change constant.

Card 2:

7. Line Number - columns 1-3. Same as Card 1 (1) above.

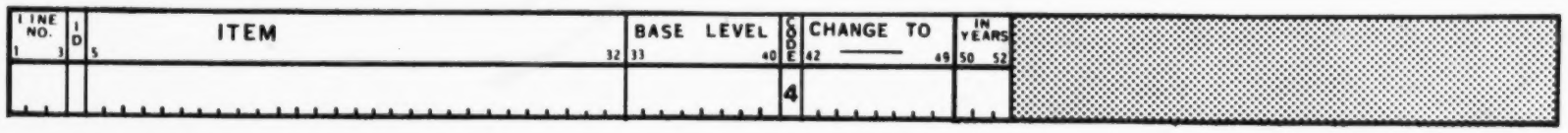
8. Sum on Line - columns 78-80. Contains the line number of the line to which values generated on this line are summed.

If the change constant is left blank, the value for the base level will be inserted along the entire planning horizon.

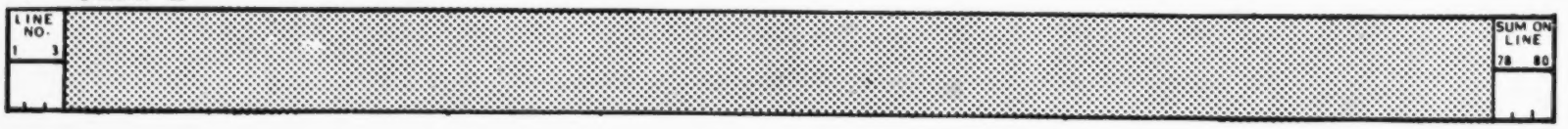
D. Code 4 - Change to Goal in Given Years

The fourth method permits the change to a given goal level in a given number of years. The goal value may be either greater than or less than the base value. It may also be either positive or negative.

Card 1



Card 2



The contents of the data fields are as follows:

Card 1:

1. Line Number - columns 1-3. Contains the line number.

2. Change ID - column 4. Contains a number to identify the changes associated with a line.

3. Item - columns 5-32. Contains a description of the contents of the line.

4. Base Level - columns 33-40. Contains the value for the base year.

5. Code - column 41. Contains the method code "4".

6. Change To - columns 42-49. Contains the value of the desired goal.

7. In Years - columns 50-52. Contains the number of years in which the goal is to be achieved.

Card 2:

8. Line Number - columns 1-3. Same as Card 1 (1) above.

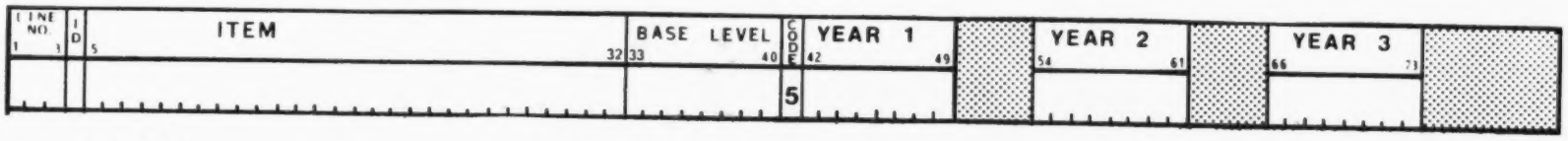
9. Sum on Line - columns 78-80. Contains the line number of the line to which values generated on this line are summed.

When the given year number is reached, that year and any remaining years of the planning horizon will contain the goal value.

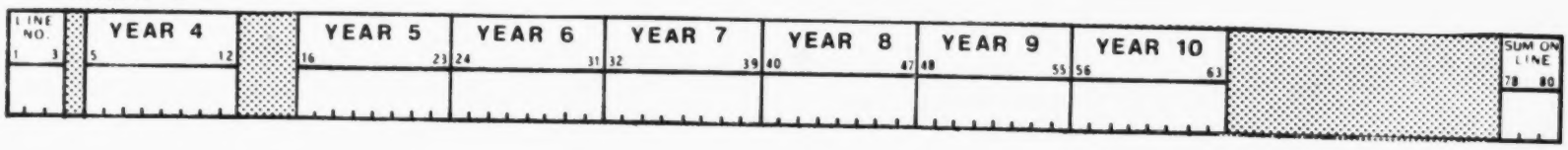
E. Code 5 - Insert Yearly Values

The fifth method permits the insertion of yearly values for the entire planning horizon.

Card 1



Card 2



The contents of the data fields are as follows:

Card 1:

1. Line Number - columns 1-3. Contains the line number.

2. Change ID - column 4. Contains a number to identify the changes associated with a line.

3. Item - columns 5-32. Contains a description of the contents of the line.

4. Base Level - columns 33-40. Contains the value for the base year.

5. Code - column 41. Contains the method code "5".

6. Year 1 - columns 42-49. Contains the value for year 1.

7. Year 2 - columns 54-61. Contains the value for year 2.

8. Year 3 - columns 66-73. Contains the value for year 3.

Card 2:

9. Line Number - columns 1-3. Same as Card 1 (1) above.

10. Year 4 - columns 5-12. Contains the value for year 4.

11. Year 5 - columns 16-23. Contains the value for year 5.

12. Year 6 - columns 24-31. Contains the value for year 6.

13. Year 7 - columns 32-39. Contains the value for year 7.

14. Year 8 - columns 40-47. Contains the value for year 8.

15. Year 9 - columns 48-55. Contains the value for year 9.

16. Year 10 - columns 56-63. Contains the value for year 10.

17. Sum on Line - columns 78-80. Contains the line number of the line to which values generated on this line are summed.

Values may be inserted in any or all of the yearly positions of the planning horizon. Fields left blank will be assumed to be zero.

F. Code 6 - Compute

The sixth method permits the use of the values of four other lines, or their multiples, in combinations of addition, subtraction, multiplication and division. The general form of the equation is as follows:

$$C_1L_1\left(\begin{matrix}+\\-\\x\\/\end{matrix}\right)C_2L_2\left(\begin{matrix}+\\-\\x\\/\end{matrix}\right)C_3L_3\left(\begin{matrix}+\\-\\x\\/\end{matrix}\right)C_4L_4\left(\begin{matrix}+\\-\\x\\/\end{matrix}\right)$$

where

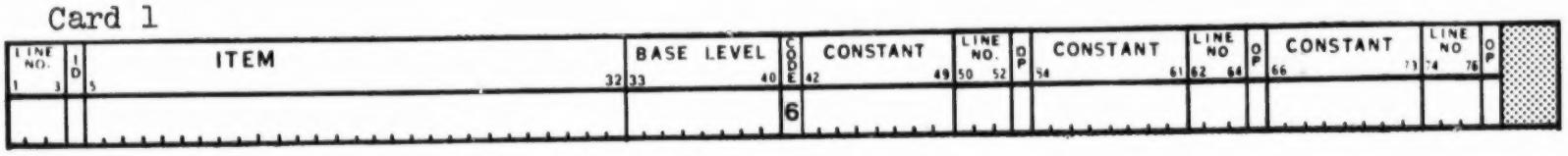
C - a constant

L - a line number

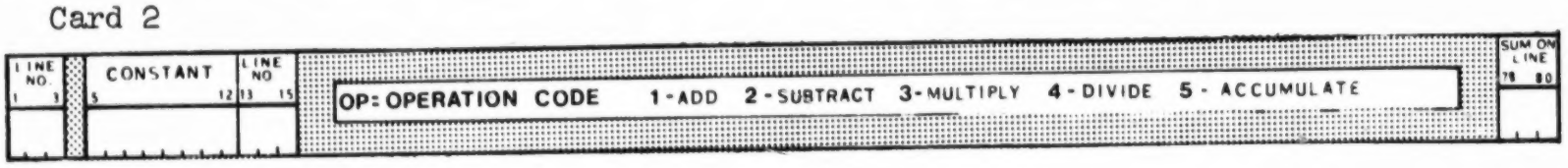
$\left(\begin{matrix}+\\-\\x\\/\end{matrix}\right)$ - indicates a choice of addition, subtraction, multiplication, or division.

An accumulation option also can be specified to accumulate values from another line.

Card 1



Card 2



The contents of the data fields are as follows:

Card 1:

1. Line Number - columns 1-3. Contains the line number.

2. Change ID - column 4. Contains a number to identify the changes associated with a line.

3. Item - columns 5-32. Contains a description of the contents of the line.

4. Base Level - columns 33-40. Contains the value for the base year.

5. Code - column 41. Contains the method code "6".

6. Constant 1 - columns 42-49. Contains the first constant value. (If the constant field is left blank, the constant is assumed to be one.)

7. Line No. 1 - columns 50-52. Contains the first compute-line number.

8. Operation Code 1 - column 53. Contains the first operation code.

9. Constant 2 - columns 54-61. Contains the second constant value.

10. Line No. 2 - columns 62-64. Contains the second compute-line number.

11. Operation Code 2 - column 65. Contains the second operation code.

12. Constant 3 - columns 66-73. Contains the third constant value.

13. Line No. 3 - columns 74-76. Contains the third compute-line number.

14. Operation Code 3 - column 77. Contains the third operation code.

Card 2:

15. Line Number - columns 1-3. Same as Card 1 (1) above.

16. Constant 4 - columns 5-12. Contains the fourth constant value.

17. Line No. 4 - columns 13-15. Contains the fourth compute-line number.

18. Sum on Line - columns 78-80. Contains the line number of the line to which values generated on this line are summed.

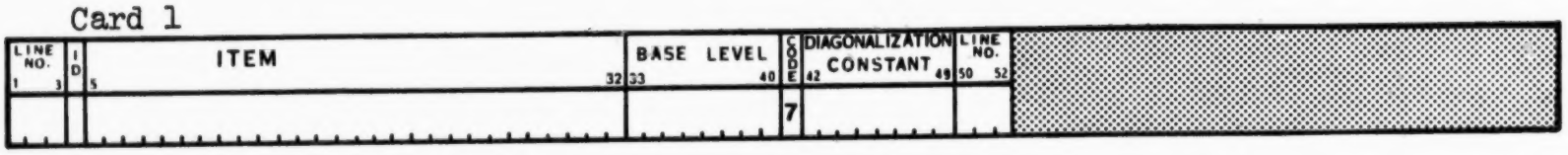
In using a Code 6, it must be kept in mind that the arithmetic operations reflected by the operation codes are performed from left to right. The operation is performed on the terms (C_1L_1 and C_2L_2) on both sides of the first operation code, and the resulting sum, difference, product, or quotient is used in conjunction with the following operation code and the next term. For example, a Code 6 might be used as follows: "Line 3 added to 5 times line 6 divided by 1.5." Line 3 will be added to 5 times line 6, and the sum will be divided by the constant value of 1.5.

For using the accumulation option, a line number is reflected in the "Line No. 1" field and a "5" is placed in the "Operation Code 1" field. This permits the values contained in the "Line No. 1" line to be accumulated across the planning horizon.

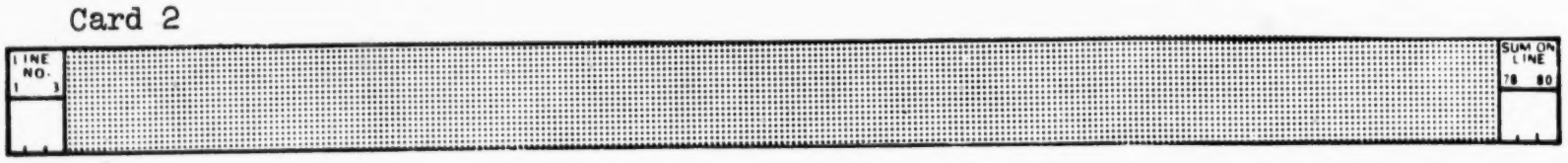
G. Code 7 - Diagonalization

The last method permits the diagonalization of a line, and the multiplication of that line by a given constant value.

Card 1



Card 2



The contents of the data fields are as follows:

Card 1:

1. Line Number - columns 1-3. Contains the line number.

2. Change ID - column 4. Contains a number to identify the changes associated with a line.

3. Item - columns 5-32. Contains a description of the contents of the line.

4. Base Level - columns 33-40. Contains the value for the base year.

5. Code - column 41. Contains the method code "7".

6. Diagonalization Constant - columns 42-49. Contains the value for the multiplication function. (If no multiplication constant is desired, leave this field blank--the constant then will be taken as one.)

7. Line Number - columns 50-52. Contains the line number of the line to be diagonalized.

Card 2:

8. Line Number - columns 1-3. Same as Card 1 (1) above.

9. Sum on Line - columns 78-80. Contains the line number of the line to which values generated on this line are summed.

The diagonalization function is accomplished by taking the values of a previously calculated line, including the base level, multiplying the values by the diagonalization constant, and shifting the resulting product one year to the right on the planning horizon.

In using any of the above seven methods, it is important to keep two requirements in mind. First, the eight character fields (base level, change, change to, year 1-10, constant 1-4, diagonalization constant), have an implied decimal point between the sixth and seventh positions. If this format is not desired, the model builder may override the implied format by inserting the decimal at any position in the field. Secondly, the three character fields (line number, in years, line number 1-4, line number) must not contain decimal points, and the values should be right adjusted within the field. Close attention to these two requirements will prevent errors in program use.

III. Summary Report Data Sheet

The third data sheet, called the Summary Report Data Sheet (Figure B-3), is used to specify which lines are to appear in the summary report(s).

The contents of the data fields are as follows:

Card 1:

1. Report Title - columns 1-24. Contains the title of the report.

Cards 2 - n:

2. Line - columns 1-3. Contains the line number of the line to be included in the report (right adjust line number).

A line can be included in any report, and can be specified any number of times. The lines will appear in the sequence that occurs following the "Report Title" card. This flexibility of report design permits reports to be as inclusive of detail or as brief as the model builder wishes.

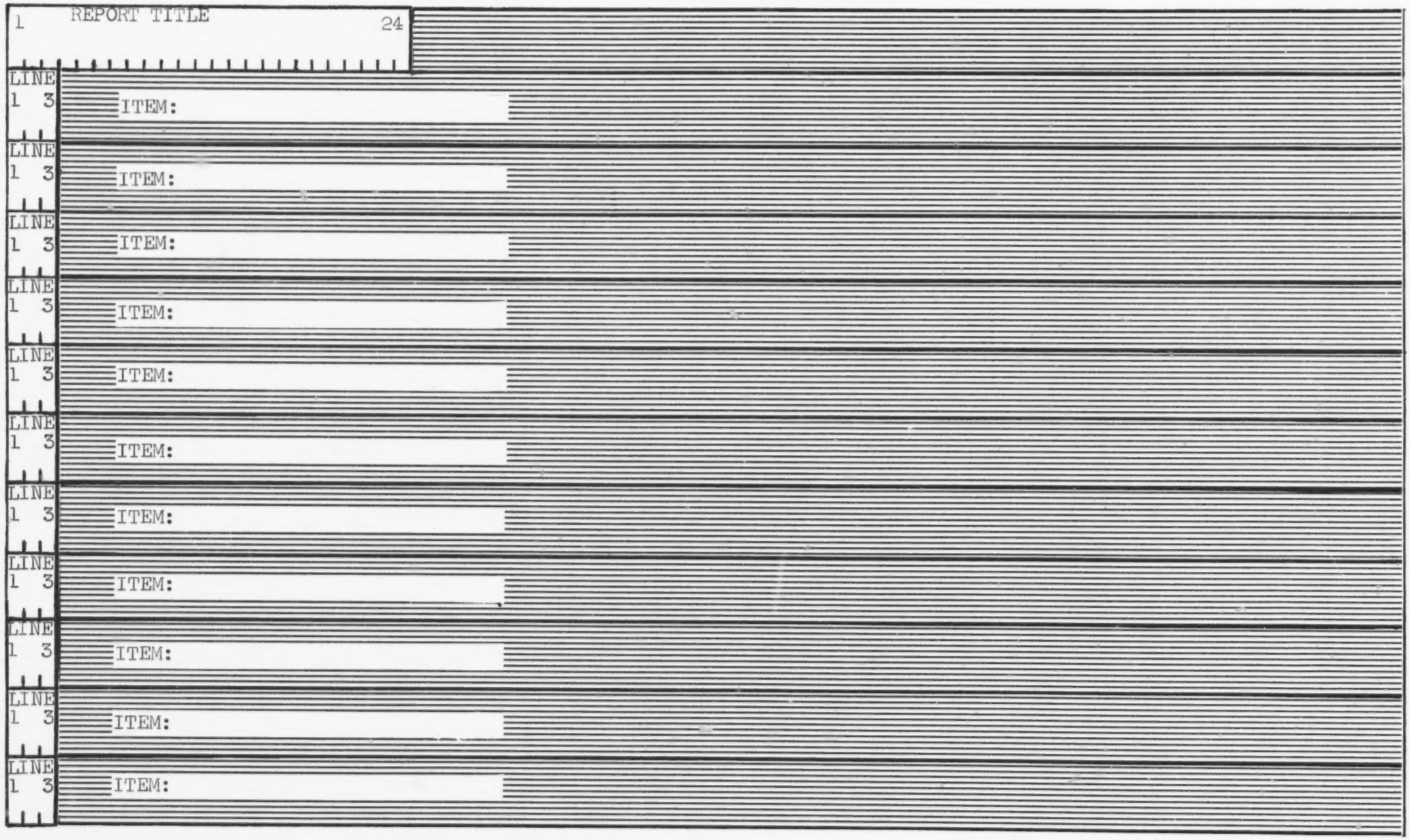


Figure B-3 - Summary Report Data Sheet

APPENDIX C

SPECIAL TECHNIQUES

In using the HELP program, the model builder will very quickly develop ways for incorporating his own ideas into the methods accommodated by the program capabilities. Included in this Appendix are some of these techniques as an example of the specialization that can be accomplished by imaginative model design.

I. Block

It has been noted that once a decision has been made as to how a line is to be calculated, the same instruction will control that line throughout the full ten-year "Planning Horizon." If the model builder wishes to insert a specific value in year 1, then write a formula or use some other means to calculate the values for years 2 through 10, this can be done by the use of a "Boolean Block" or just "BLOCK", i.e., the insertion of a series of 1's as a multiplier.

To provide an example of using the block, the following problem is given:

> "The FTE faculty for year 1 is already determined at a value of 45. Following that year, the number of faculty is to be controlled as a function of the number of students and a given student-faculty ratio."

Figure C-1 shows the line number, the item, the base (where applicable), and the method of determination used to generate the line information.

Figure C-2 shows the model program output for each line through the entire planning horizon.

Had the formula for Faculty, line 5, been written, "Divide line 2 by line 4," without including lines 1 and 3, the result value for line 5 in year 1 would have been 43.1. However, since there had already been a decision to have 45 faculty members in year 1, the budget and other calculations which used the number of faculty would be in error had the value of 45 not been used.

Line No.	Item	Base	Code	Method of Determination
1	Block - Years 2-10	--	5	Provide values of 1.0 for years 2-10.
2	FTE Students	540.0	4	Change to 1,000 in 10 years.
3	FTE Faculty - Year 1	--	5	Provide value of 45.0 for year 1.
4	Student-Faculty Ratio	12.5	4	Change to 18.0 in 5 years.
5	FTE Faculty	44.0	6	Divide line 2 by line 4, times line 1, plus line 3.

Figure C-1 - Example of a Block (a)

Line No.	Item	Base	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8	Yr9	Yr10
1	Block - Years 2-10	--	--	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2	FTE Students	540.0	586.0	632.0	678.0	724.0	770.0	816.0	862.0	908.0	954.0	1,000.0
3	FTE Faculty - Year 1	--	45.0	--	--	--	--	--	--	--	--	--
4	Student-Faculty Ratio	12.5	13.6	14.7	15.8	16.9	18.0	18.0	18.0	18.0	18.0	18.0
5	FTE Faculty	44.0	45.0	42.9	42.9	42.8	42.8	45.3	47.8	50.5	54.0	55.5

Figure C-2 - Example of a Block (b)

Therefore, although line 4 reflects that, according to instructions, there should have been a student-faculty ratio value of 13.6 for year 1, the actual ratio will be 13.0.

In calculating values for FTE faculty, line 5, the program will divide line 2 by the ratio given in line 4, and multiply the result by line 1. This gives values for years 2 through 10, but produces zero for year 1. Line 3, with a given value for year 1, is then added, which completes the planning horizon.

This technique can be used in any number of relationships associated with an educational institution, i.e., the addition or deletion of floor space for classrooms or offices in the inventory of facilities, insertion of a known expense or income value among values otherwise determined by a formula, or many other situations. By using this technique, the flexibility of the modeling program is brought down to the line calculation.

II. False Base

In a method similar to the block, it is possible to project a goal from the first year instead of the true base by use of a false base. For example, assume that the current enrollment is 825, that 840 are expected to enroll in year 1, and that a steady growth is to be projected from 840 to 1,200 in the tenth year.

It must be noted in using the method of changing to a given value in a given number of years, the program divides the difference between the base and the given value by the given number of years to reach the goal, and adds that product to the base and to each subsequent year.

The line number, item, base, and method of determination for the problem given above are reflected in Figure C-3.

Line No.	Item	Base	Code	Method of Determination
1	Student Projections	800	4	Change to 1,200 in 10 years.
2	FTE Students	825	6	Line 1 times 1.0.

Figure C-3 - Example of a False Base (a)

The value of 800 for the false base was determined in the following manner:

1,200 (goal) minus 840 (year 1 expected) = 360 (difference) for 9 years

360 divided by 9 (years) = 40, the amount of change per year

840 (year 1 expected) minus 40 (annual change) = 800, which is the false base.

Figure C-4 shows the model program output. Line 2 will be the line used in the reports, and in any subsequent calculations which depend on the FTE student values.

An extension of this technique will calculate the values from any given year to any goal year. Suppose that a new program is scheduled to start in year 2 with 60 students, and is expected to reach a goal level of 200 in year 7. The false base is determined as follows:

200 (goal) minus 75 (year 2 expected) = 125 (difference) for 5 years

125 divided by 5 (years) = 25, the amount of change per year

75 (year 2 expected) minus 50 (2 times 25/year change) = 25, the false base.

It will be necessary to use a block line to drop out year 1. The line numbers, item, base, and method of determination are reflected in Figure C-5.

Figure C-6 shows the program output. Line 3 would be used for any subsequent calculations which depend on these figures.

III. Applications of Other Planning or Analysis Techniques

This section is included for two reasons. First, the specific formula and its adaptation to the HELP program may be useful to planners in higher education. Second, it demonstrates a way in which a manual analysis formula may be adapted for use with the planning program.

Line No.	Item	Base	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8	Yr9	Yr10
1	Student Projections	800	840	880	920	960	1,000	1,040	1,080	1,120	1,160	1,200
2	FTE Students	825	840	880	920	960	1,000	1,040	1,080	1,120	1,160	1,200

Figure C-4 - Example of a False Base (b)

Line No.	Item	Base	Code	Method of Determination
1	Block - Years 2-10	--	5	Provide values of 1.0 for years 2-10.
2	New Program Projection	--	4	Change to 200 in 7 years.
3	New Program	--	6	Line 1 times line 2.

Figure C-5 - Example of a False Base (c)

Line No.	Item	Base	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8	Yr9	Yr10
1	Block - Years 2-10	--	--	1	1	1	1	1	1	1	1	1
2	New Program Projection	25	50	75	100	125	150	175	200	200	200	200
3	New Program	--	--	75	100	125	150	175	200	200	200	200

Figure C-6 - Example of a False Base (d)

It is frequently desirable to indicate an average faculty salary for planning and communication purposes. The average faculty salary times the FTE faculty equals total instructional salaries. However, the average salary paid to those in any rank will depend not only on the overall average salary, but also on two other factors: (1) the distribution of faculty by rank, and (2) the distribution of the salaries by various ranks. If a college had equal numbers of faculty in each of four ranks, and the salaries were distributed symmetrically (using average instructor salary as 1.0, average assistant as 1.4, average associate as 1.6, and average professor as 2.0), then the overall average would be equivalent to 1.5 times that of the instructors.

To analyze this situation, use the following table:

TABLE C-1

SALARY ANALYSIS (a)

A	B	C	D	E
Instructor	25	1.0	25	0.66
Assistant	25	1.4	35	0.93
Associate	25	1.6	40	1.07
Professor	25	2.0	50	1.33
			Σ D150	

where

A = Rank

B = Percent of faculty in rank

C = Average salary of each rank as a factor of average salary of instructor

D = Load factor of each rank (D = B x C)

E = Average salary of each rank as factor of overall average ($E = C/\Sigma D/100$).

Thus, the average salary for each rank can be found by using the multiplier in column E with the projected overall average salary. The above table assumes a symmetrical relationship in both columns B and C. Suppose that relationships are irregular for columns B and C, as shown in the following table:

TABLE C-2

SALARY ANALYSIS (b)

A	B	C	D	E
Instructor	20	1.0	20	0.61
Assistant	20	1.3	26	0.80
Associate	25	1.6	40	0.98
Professor	35	2.2	77	1.35
			ΣD163	

where A, B, C, D, and E are defined as in Table C-1.

This table shows that the overall average is equivalent to 1.63 times the average salary for instructors, or, to express it another way, the average salary for instructors is equal to 0.61 of the overall average. Also, because of the high percentage of faculty at the rank of professor, and the high relationship their salary has to those of lower ranks, 77/163, or 47%, of the total instructional budget goes to faculty members of the professor rank.

By converting this technique of salary analysis to the format of the HELP program, analysis can be made of the effects of varying distributions of faculty by ranks, and the distributions of salaries by ranks. The conversion is relatively simple, accomplished by transferring each step of the technique used to create the table to a line of the program instructions.

Figures C-7 and C-8 reflect the line numbers, items, base data, codes, and method of determination for a salary analysis segment. The basic task requires 16 lines, but additional lines have been provided which might be helpful in giving information useful for planning purposes. The actual data are from Table C-2.

Lines 17 through 21 show what the information means in terms of dollars.

Line No.	Item	Base	Code	Method of Determination
1	Instr. as % of Faculty	20	4	Change to 25.0 in 4 years.
2	Ass't as % of Faculty	20	4	Change to 30.0 in 4 years.
3	Assoc. as % of Faculty	25	2	No change.
4	Prof. as % of Faculty	35	6	100 minus line 1, minus line 2, minus line 3.
5	Ass't Salary Factor Instr.	130	4	Change to 135 in 2 years.
6	Assoc. Salary Factor Instr.	160	4	Change to 170 in 2 years.
7	Prof. Salary Factor Instr.	220	2	No change.
8	Instr. Salary Load Factor	20	6	Multiply line 1 times 1.0, sum on line 12.
9	Ass't. Salary Load Factor	26	6	Multiply line 2 times 0.01 of line 5, sum on line 12.
10	Assoc. Salary Load Factor	40	6	Multiply line 3 times 0.01 of line 6, sum on line 12.
11	Prof. Salary Load Factor	77	6	Multiply line 4 times 0.01 of line 7, sum on line 12.
12	Total Load Factor	163	1	Summary of lines 8, 9, 10, and 11.
13	Instr. Salary as % Avg.	61	6	Divide 100 by line 12, times 100.
14	Ass't.Salary as % Avg.	80	6	Divide line 9 by line 12, times 100.
15	Assoc. Salary as % Avg.	98	6	Divide line 10 by line 12, times 100.
16	Prof. Salary as % Avg.	135	6	Divide line 11 by line 12, times 100.

Figure C-7 - Salary Analysis Example (a)

Line No.	Item	Base	Code	Method of Determination
17	Overall Average Salary	10,500	2	Change by 4% per year.
18	Average Salary Instr.	--	6	Multiply line 17 times 0.01 of line 13.
19	Average Salary Ass't.	--	6	Multiply line 17 times 0.01 of line 14.
20	Average Salary Assoc.	--	6	Multiply line 17 times 0.01 of line 15.
21	Average Salary Prof.	--	6	Multiply line 17 times 0.01 of line 16.
22	FTE Faculty	35	3	Change by 3 per year.
23	Instructors	--	6	Multiply line 22 times 0.01 of line 1.
24	Assistants	--	6	Multiply line 22 times 0.01 of line 2.
25	Associates	--	6	Multiply line 22 times 0.01 of line 3.
26	Professors	--	6	Multiply line 22 times 0.01 of line 4.
27	Total Salaries Instr.	--	6	Multiply line 18 times line 23, sum on line 31.
28	Total Salaries Ass't.	--	6	Multiply line 19 times line 24, sum on line 31.
29	Total Salaries Assoc.	--	6	Multiply line 20 times line 25, sum on line 31.
30	Total Salaries Prof.	--	6	Multiply line 21 times line 26, sum on line 31.
31	Total Salaries Faculty	--	1	Summary of lines 27, 28, 29, and 30.
32	Check Average	--	6	Divide line 31 by line 22.

Figure C-8 - Salary Analysis Example(b)

Lines 22 through 26 give information as to the number of faculty in each rank.

Lines 27 through 31 give total salaries for each rank and the whole faculty.

Line 32 provides a check average, to insure the accuracy of our formulas.

The result values derived for the entire planning horizon of the above 32 line segment are reflected in Figure C-9.

From this set of data and calculations, several facts can be determined. The number of faculty and the average salary can be projected, and the average salary for each rank is identified. The effects of various distributions of faculty by ranks and the effects of distributions of salaries by ranks can be noted. This type of planning information is helpful to colleges wishing to achieve higher AAUP ratings, since emphasis is not only to raise the overall average salaries, but also to give attention to the distribution of salaries among the ranks.

As the model builder gains experience in the use of the HELP program, the adaptation of various formulas related to planning will provide an expansion of the model for his institution and permit the analysis of the effects of those formulas.

Line No.	Item	Base	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7	Yr8	Yr9	Yr10
1	Instr. as % of Faculty	20.0	21.3	22.5	23.8	25.0	25.0	25.0	25.0	25.0	25.0	25.0
2	Assist. as % of Faculty	20.0	22.5	25.0	27.5	30.0	30.0	30.0	30.0	30.0	30.0	30.0
3	Assoc. as % of Faculty	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
4	Prof. as % of Faculty	35.0	31.3	27.5	23.8	20.0	20.0	20.0	20.0	20.0	20.0	20.0
5	Assist. Salary Factor Instr.	130.0	132.5	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0
6	Assoc. Salary Factor Instr.	160.0	165.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0
7	Prof. Salary Factor Instr.	220.0	220.0	220.0	220.0	220.0	220.0	220.0	220.0	220.0	220.0	220.0
8	Instr. Salary Load Factor	20.0	21.3	22.5	23.8	25.0	25.0	25.0	25.0	25.0	25.0	25.0
9	Assist. Salary Load Factor	26.0	29.8	33.7	37.1	40.5	40.5	40.5	40.5	40.5	40.5	40.5
10	Assoc. Salary Load Factor	40.0	41.2	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.5
11	Prof. Salary Load Factor	77.0	68.7	60.5	52.2	44.0	44.0	44.0	44.0	44.0	44.0	44.0
12	Total Load Factor	163.0	161.1	159.2	155.6	152.0	152.0	152.0	152.0	152.0	152.0	152.0
13	Instr. Salary as % Avg.	61.0	62.1	62.8	64.3	65.8	65.8	65.8	65.8	65.8	65.8	65.8
14	Assist. Salary as % Avg.	80.0	82.3	84.8	86.7	88.8	88.8	88.8	88.8	88.8	88.8	88.8
15	Assoc. Salary as % Avg.	98.0	102.4	106.8	109.2	111.8	111.8	111.8	111.8	111.8	111.8	111.8
16	Prof. Salary as % Avg.	135.0	136.6	138.1	141.4	144.7	144.7	144.7	144.7	144.7	144.7	144.7
17	Overall Average Salary	10500	10919	11356	11811	12283	12774	13285	13817	14364	14944	15542
18	Average Salary Instr.	-	6779	7131	7589	8081	8404	8740	9090	9453	9832	10225
19	Average Salary Assist.	-	8983	9627	10245	10909	11346	11799	12271	12762	13273	13804
20	Average Salary Assoc.	-	11186	12123	12902	13738	14287	14859	15453	16071	16714	17383
21	Average Salary Prof.	-	14915	15689	16696	17778	18489	19229	19998	20798	21630	22495
22	FTE Faculty	35.0	38.0	41.0	44.0	47.0	50.0	53.0	56.0	59.0	62.0	65.0
23	Instructors	-	8.1	9.2	10.4	11.7	12.5	13.2	14.0	14.7	15.5	16.2
24	Assistants	-	8.5	10.2	12.1	14.1	15.0	15.9	16.8	17.7	18.6	19.5
25	Associates	-	9.5	10.2	11.0	11.7	12.5	13.2	14.0	14.7	15.5	16.2
26	Professors	-	11.9	11.3	10.4	9.4	10.0	10.6	11.2	11.8	12.4	13.0
27	Total Salaries Instr.	-	54748	65787	79309	94954	105056	115813	127264	139445	152397	166161
28	Total Salaries Assist.	-	76808	98681	123973	153826	170191	187618	206168	225901	246883	269182
29	Total Salaries Assoc.	-	106276	124264	141922	161422	178595	196883	216349	237056	259075	282475
30	Total Salaries Prof.	-	177126	176894	174481	167120	184898	203832	223985	245423	268218	292445
31	Total Salaries Faculty	-	414959	465628	519686	577324	638741	704148	773766	847826	926574	1010264
32	Check Average		10919	11356	11811	12283	12774	13285	13817	14369	14944	15542

Figure C-9 - Salary Analysis Example (c)

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